



Knowledge Management's Role in Resetting the Vision

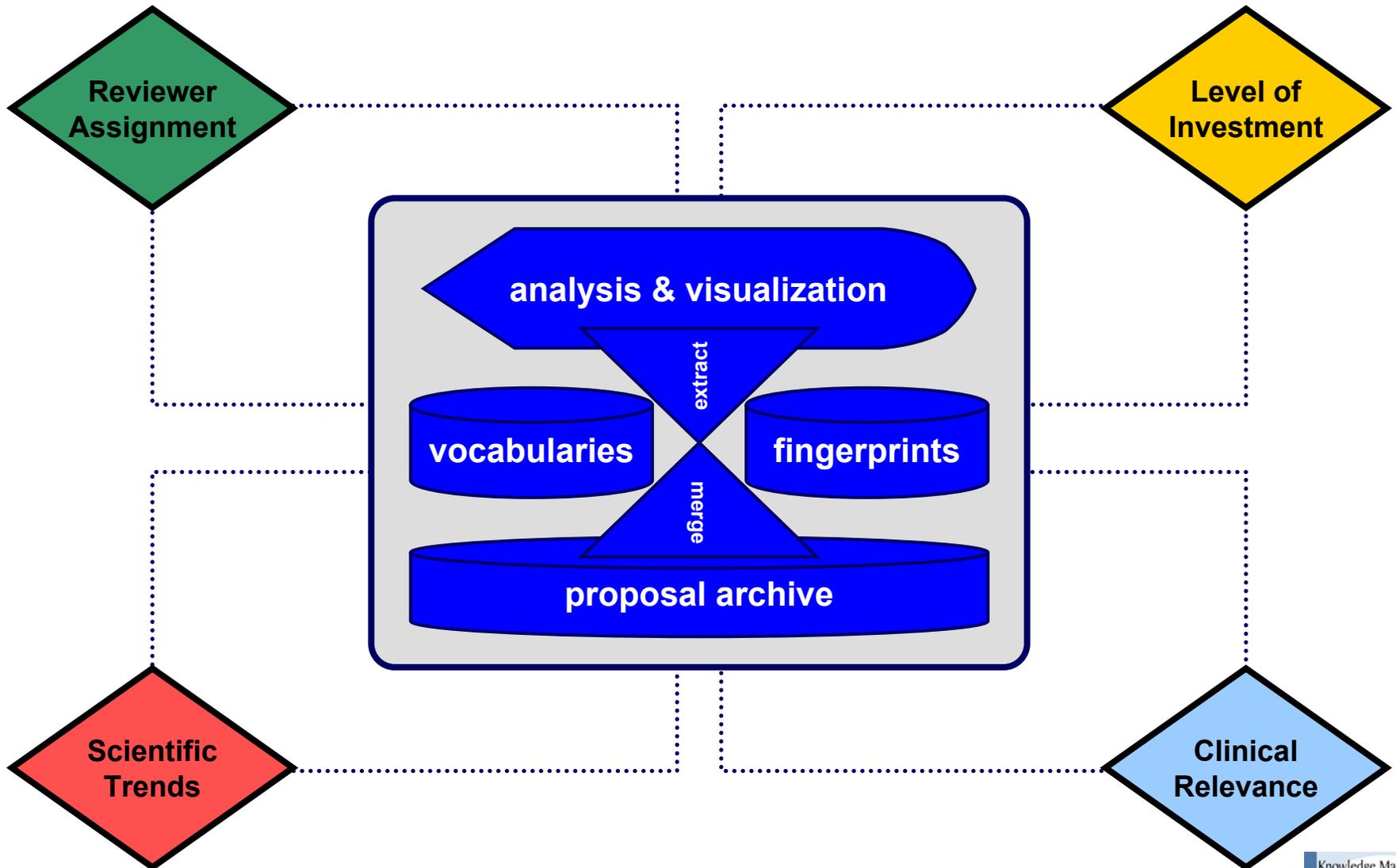
New Capabilities: 1 Year Later & Beyond

A presentation at the eRA Project Team Retreat

10 October 2003

Dr. Bob Lewis

KM and the work of NIH



The Application of Knowledge Management

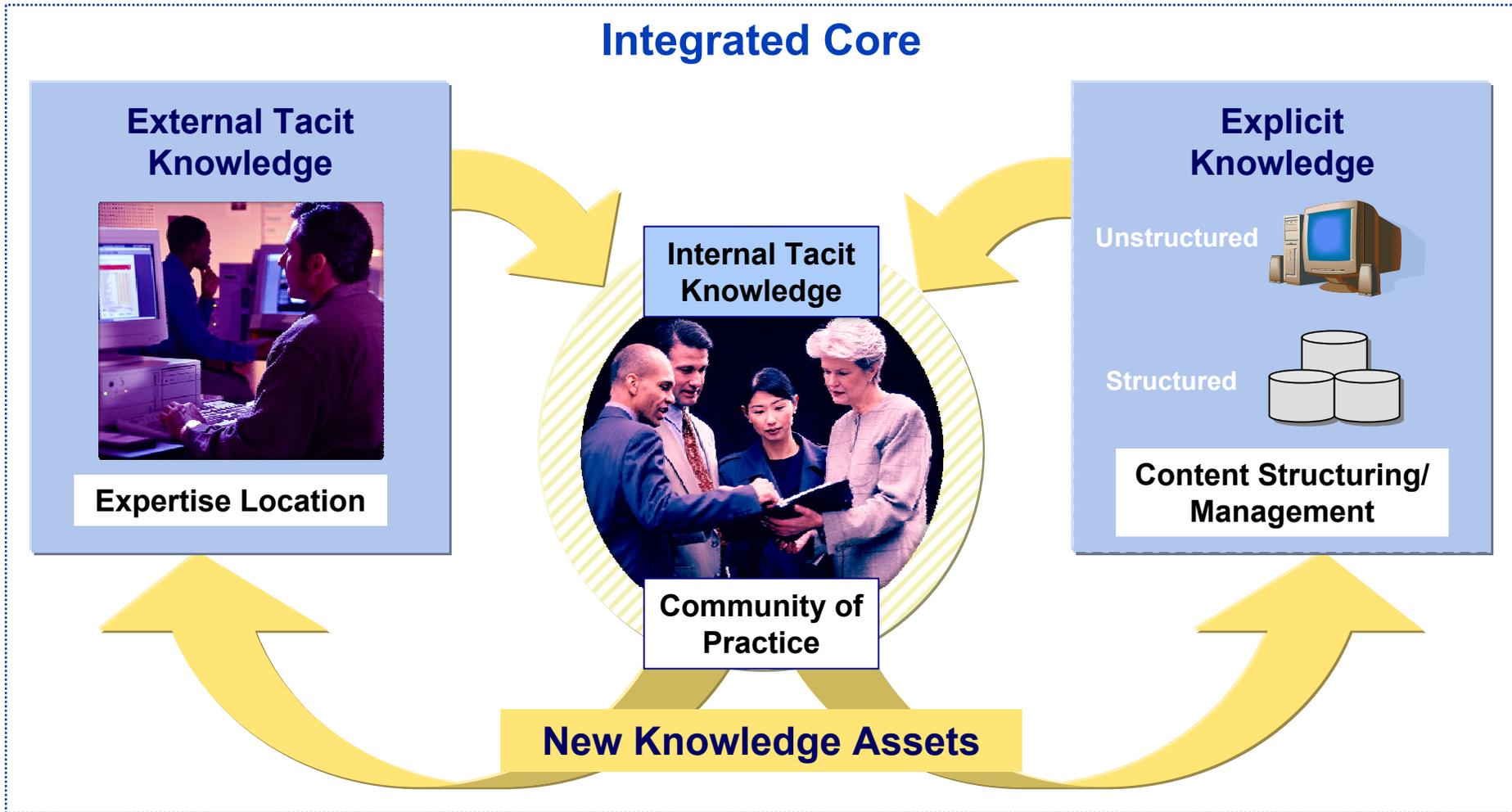
New Capabilities & Dramatically Improved Processes



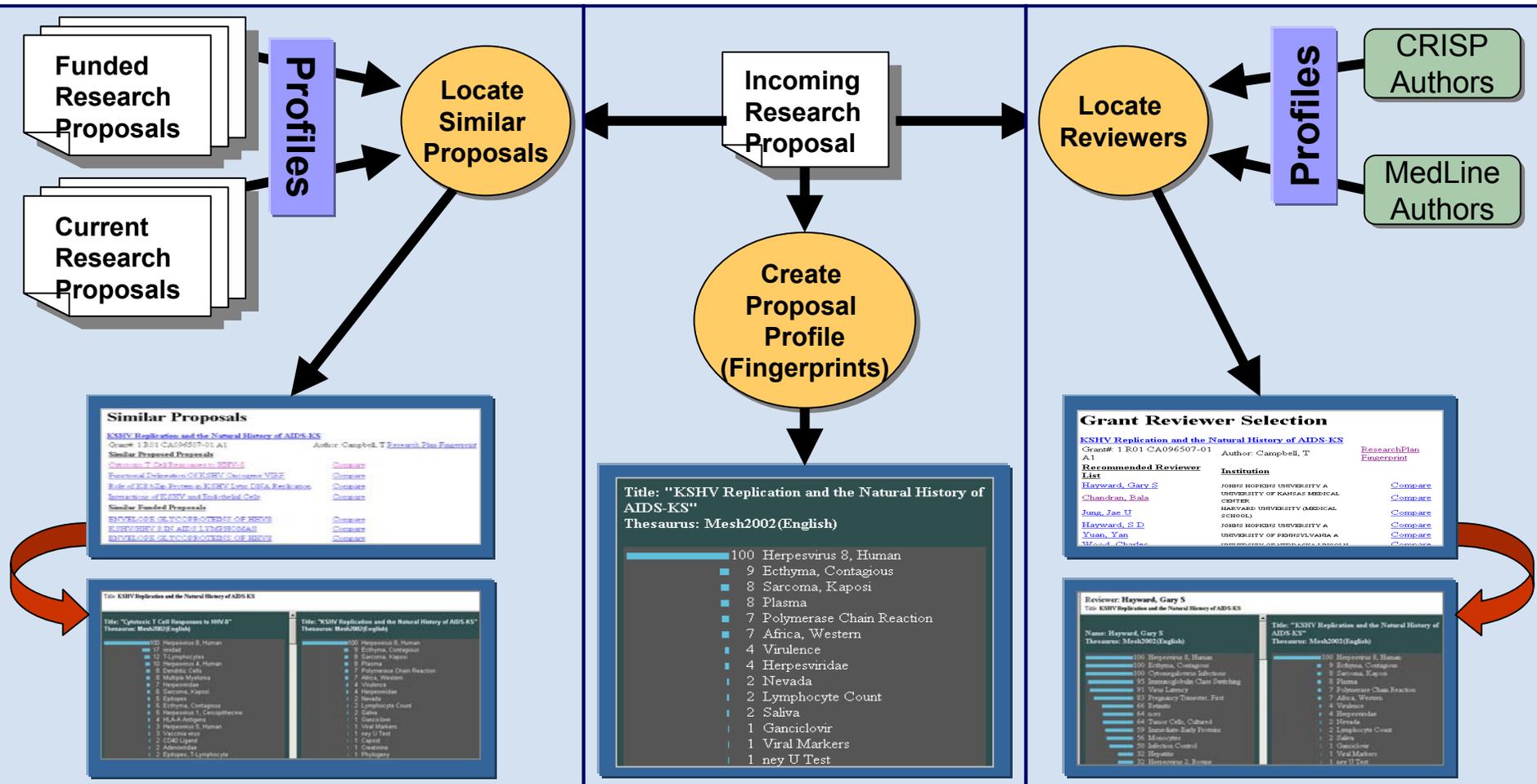
KM is a process of identifying, capturing, organizing, and leveraging knowledge assets within an organization to improve performance and efficiency.

Core Element	Function	NIH Application
<i>Expertise Location</i>	Capture and share the experience, expertise and insight of people	• <i>Grant Reviewer Selection (GRS)</i>
<i>Text Mining & Categorization</i>	Provide broad access, without regard to their source or structure, to information assets	• <i>Grant Reviewer Selection II (GRS II)</i> • <i>Grant Tracking for Executive Decision Making</i>
<i>Collaboration</i>	Facilitate work and interest group activities with members in different places and focus groups	• <i>Communities of Practice (Proposed FY04)</i>
<i>Integration & Portals</i>	Give users individualized, universal access to KM resources	• <i>System-of-Systems (Future)</i>

Integration of KM Components



Reviewer Assignment



Dumais, S.T. and Nielsen, J. "Automating the Assignment of Submitted Manuscripts to Reviewers" In Proceedings of ACM SIGIR'92 ACM, 1992, pp. 233



Identify Similar Research Proposals

Current Proposed and Previously Funded Proposals

Enter Grant Number in single quotes

'1 R01 CA096507-01 A1'

Find

List all Proposed and Funded Research Proposals containing similar research

Similar Proposals

[KSHV Replication and the Natural History of AIDS-KS](#)

Grant#: 1 R01 CA096507-01 A1

Author: Campbell, T [Research Plan Fingerprint](#)

Similar Proposed Proposals

[Cytotoxic T Cell Responses to HHV-8](#)

Compare

[Functional Delineation Of KSHV Oncogene VIRF](#)

Compare

[Role of K8 bZip Protein in KSHV Lytic DNA Replication](#)

Compare

[Interactions of KSHV and Endothelial Cells](#)

Compare

Similar Funded Proposals

[ENVELOPE GLYCOPROTEINS OF HHV8](#)

Compare

[KSHV/HHV 8 IN AIDS LYMPHOMAS](#)

[ENVELOPE GLYCOPROTEINS OF HHV8](#)

Identify Similar Proposals by comparing fingerprints

Title: KSHV Replication and the Natural History of AIDS-KS

Title: "Cytotoxic T Cell Responses to HHV-8"
Thesaurus: Mesh2002(English)

- 100 Herpesvirus 8, Human
- 17 rinidad
- 12 T-Lymphocytes
- 10 Herpesvirus 4, Human
- 8 Dendritic Cells
- 8 Multiple Myeloma
- 7 Herpesviridae
- 6 Sarcoma, Kaposi
- 5 Epitopes
- 5 Ecthyma, Contagious
- 5 Herpesvirus 1, Cercopithecine
- 4 HLA-A Antigens
- 3 Herpesvirus 5, Human
- 3 Vaccinia virus
- 2 CD40 Ligand
- 2 Adenoviridae
- 2 Epitopes, T-Lymphocyte

Title: "KSHV Replication and the Natural History of AIDS-KS"
Thesaurus: Mesh2002(English)

- 100 Herpesvirus 8, Human
- 9 Ecthyma, Contagious
- 8 Sarcoma, Kaposi
- 8 Plasma
- 7 Polymerase Chain Reaction
- 7 Africa, Western
- 4 Virulence
- 4 Herpesviridae
- 2 Nevada
- 2 Lymphocyte Count
- 2 Saliva
- 1 Ganciclovir
- 1 Viral Markers
- 1 ney U Test
- 1 Capsid
- 1 Creatinine
- 1 Phylogeny

Identify Research Duplications

Uncover Multiple Submissions of Research Proposals

Enter Grant Number

List all applications containing duplicate research

Acute and Continuation Treatment of Late-Life Mania

Grant#: 1 R01 MH068846-01

Author: "Mulsant, B" [Research Plan Fingerprint](#)

Similar Proposed Proposals

[Acute and Continuation Treatment in Late Life Mania](#)

Grant # Author Matching Score

[Acute and Continuation Treatment of Late-Life Mania](#)

1 R01 MH068848-01 "Beyer, J" 99.8324

[Compare](#)

1 R01 MH068842-01 "Shulman, K" 99.7427

[Compare](#)

Identify Duplicate applications by comparing fingerprints

Actual Text from these applications

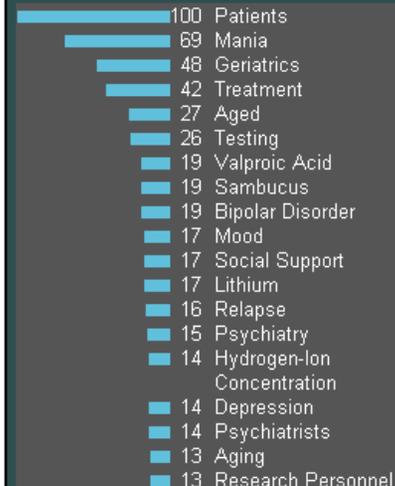
COLLABORATIVE CSMD R01 COMPONENTS

This proposed study of "Acute and Continuation Treatment of Late-Life Mania" is submitted in response to program announcement PAR-01-123 (Collaborative R01 s for Clinical Studies of Mental Disorders). The following paragraphs describe the rationale, structure, and function of our collaborative study.

1. Individual Participating Sites: **Five groups** will collaborate in this application to study the treatment of mania and mixed states in late life. The groups are **Comell (PI: R.Young)**, the University of **Pittsburgh (PI: B. Mulsant)**, the University of **Pennsylvania (PI: L. Gyulai)**, **Duke University (PI: J. Beyer)**, and the **University of Toronto (PI: K. Shulman; Co-PI: A. Flint)**. Comell serves as the Study Coordinating Center (SCC) with **Dr. Young as the overall PI**.

Title: Acute and Continuation Treatment of Late-Life Mania

Title: "Acute and Continuation Treatment in Late Life Mania"
Thesaurus: mesh2002



Title: "Acute and Continuation Treatment of Late-Life Mania"
Thesaurus: mesh2002



Locating Subject Matter Experts

Cross-disciplinary Expertise

Search for Experts based on MeSH Thesaurus terms

Find Experts

HHV-8

Search

Recommended Reviewer List

Institution

2	Hayward, Gary S	JOHNS HOPKINS UNIVERSITY A
3	Jung, Jae U	HARVARD UNIVERSITY (MEDICAL SCHOOL)
4	Nicholas, John	JOHNS HOPKINS UNIVERSITY
5	Sun, Ren	UNIVERSITY OF CALIFORNIA LOS ANGELES
6	Hayward, S D	JOHNS HOPKINS UNIVERSITY A
7	Osmond, Dennis H	UNIVERSITY OF CALIFORNIA SAN FRANCISCO
8	Chang, Yuan	COLUMBIA UNIVERSITY HEALTH SCIENCES
9	Wood, Charles	UNIVERSITY OF NEBRASKA LINCOLN
10	Yuan, Yan	UNIVERSITY OF PENNSYLVANIA A

View Expert Profile

Name: Chandran, Bala
Thesaurus: Mesh2002(English)

- 100 Herpesvirus 8, Human
- 18 Ectyma, Contagious
- 15 lence
- 14 Sarcoma
- 14 Tropism
- 9 Immunity, Humoral
- 7 Asp
- 7 Sarcoma, Kaposi
- 7 Infection Control
- 7 Herpesviridae
- 6 Virus Replication
- 6 cDNA Library
- 5 CHO Cells
- 5 Role
- 5 Serology
- 5 Immunosorbents
- 5 Serodiagnosis
- 5 Heparin
- 5 Immunization, Active
- 4 Glycoproteins
- 4 Immunogenetics

Scientific Trends: Conduct "What-If" Analysis

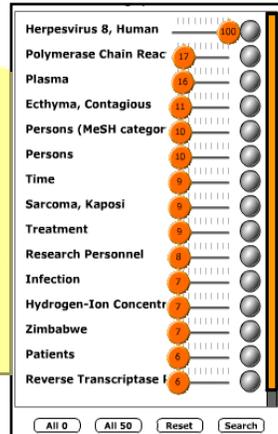
Augment Searches based on Concept Relevance

Enter Grant Number

'1 R01 CA096507-01 A1'

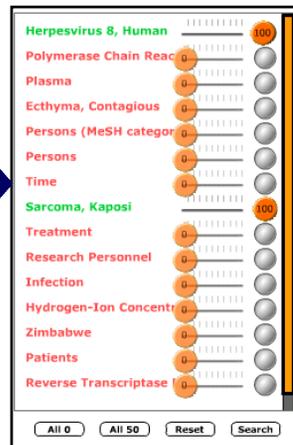
Search for similar proposals

Proposal Fingerprints



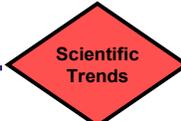
Similar Proposed Proposals		Grant #	Author	
Cytotoxic T Cell Responses to HHV-8		2 R01 CA082053-04	Rinaldo, C	Compare
Functional Delineation Of KSHV Oncogene VIRF		1 R01 CA097933-01	Gao, Shou-Jiang	Compare
Role of K8 bZip Protein in KSHV Lytic DNA Replication		1 R01 AI052789-01	YUAN, Y	Compare
Interactions of KSHV and Endothelial Cells		1 R01 CA097934-01	Lagunoff, M	Compare
Similar Funded Proposals		Grant #	IRG	
ENVELOPE GLYCOPROTEINS OF HHV8		5_R01CA082056-04	ZRG1	Compare
KSHV/HHV 8 IN AIDS LYMPHOMAS		5_R01CA068939-07	ZRG1	Compare
ENVELOPE GLYCOPROTEINS OF HHV8		R01CA82056-02	ZRG1	Compare
INTERACTIONS BETWEEN HIV AND KSHV		R01CA76958-03	ARRA	Compare
INDUCTION OF KSHV REPLICATION BY HIV 1		R55CA83527-01A1	ZRG1	Compare

Modify Search Criteria on the fly



Revised List

Similar Proposed Proposals		Grant #	Author	
KSHV Replication and the Natural History of AIDS-KS		1 R01 CA096507-01 A1	Campbell, T	Compare
Functional Delineation Of KSHV Oncogene VIRF		1 R01 CA097933-01	Gao, Shou-Jiang	Compare
Interactions of KSHV and Endothelial Cells		1 R01 CA097934-01	Lagunoff, M	Compare
Cytotoxic T Cell Responses to HHV-8		2 R01 CA082053-04	Rinaldo, C	Compare
Role of K8 bZip Protein in KSHV Lytic DNA Replication		1 R01 AI052789-01	YUAN, Y	Compare
Similar Funded Proposals		Grant #	IRG	
HUMAN HERPESVIRUS 8 INFECTION IN ZIMBABWE		R03TW01123-02	ZRG1	Compare
The Role of T1.1 RNA in KSHV Replication		5_F32CA088516-02	ZRG1	Compare
HYPERVARIABLE ORF-K1 SIGNALING PROTEIN OF KSHV/HHV8		R01CA81422-02	ZRG1	Compare
KAPOSIS SARCOMA ASSOCIATED HERPESVIRUS VIRAL INTERFERON REGULATORY FACTOR		P51RR00168-39_0057	RIRG	Compare



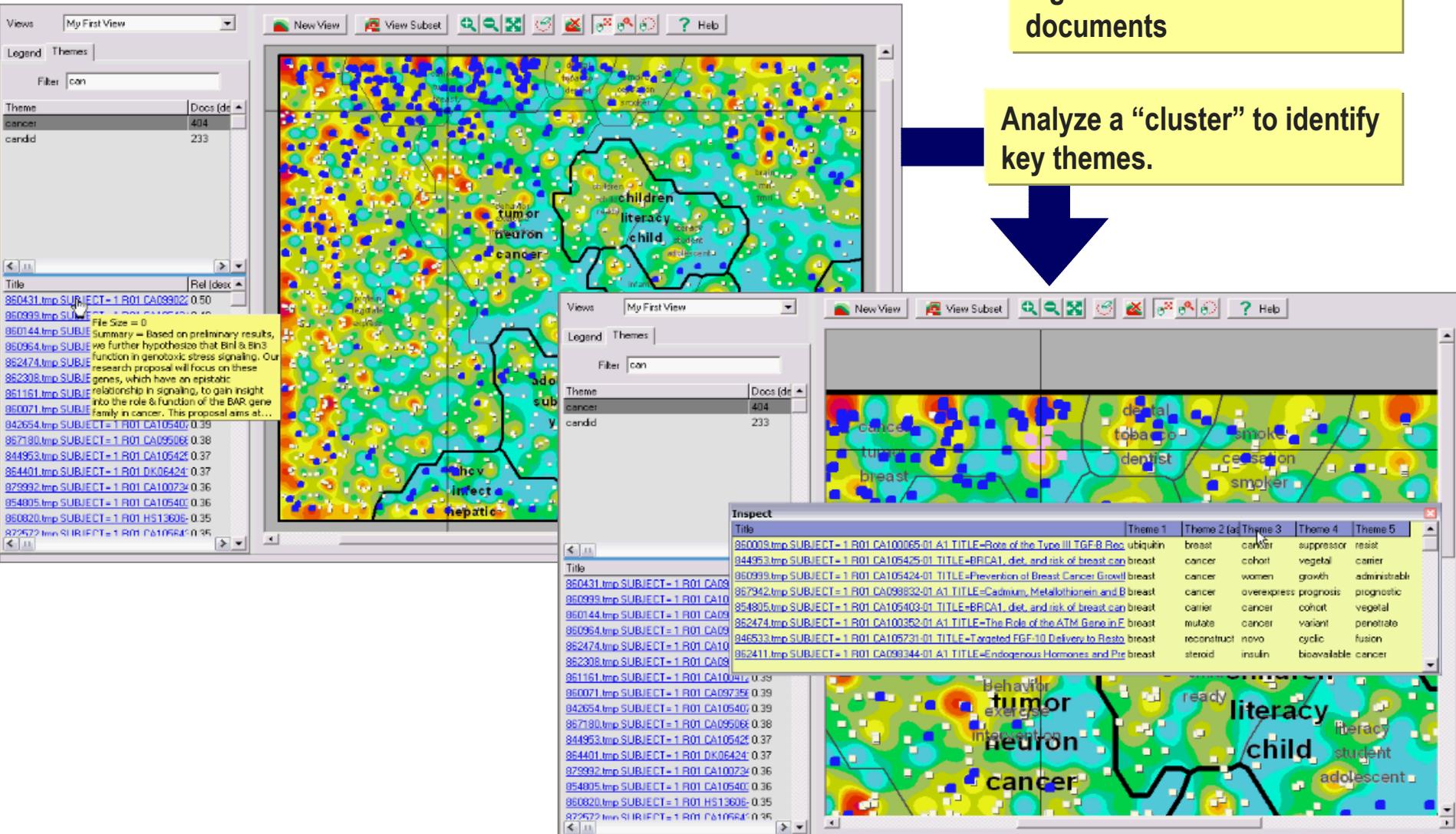
Relationships and Patterns from Text

"Situational Awareness" Perspective of Information

Click a "Theme" to highlight all related documents in the map

Color Intensity represents high concentrated cluster of documents

Analyze a "cluster" to identify key themes.



Scientific Trends

“Situational Awareness” and Hot Zones

Start Date: [Default](#) [Minimum](#)

End Date: [Default](#) [Maximum](#)

Date filters remain active across all selections and discovery tools.

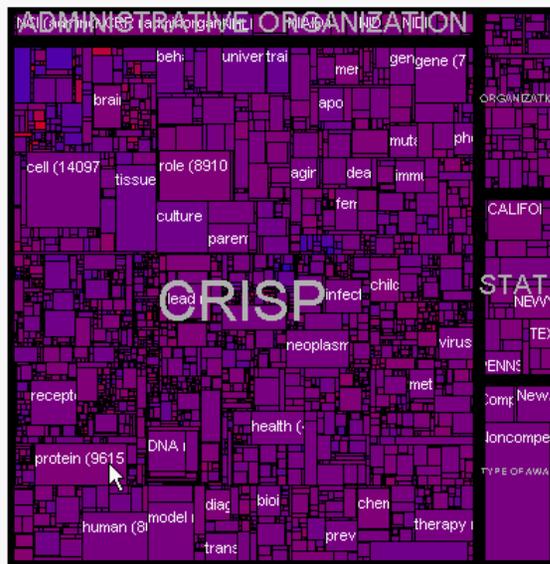
Entity Groups

type_of_award

Limit search to selection

Selected Entities

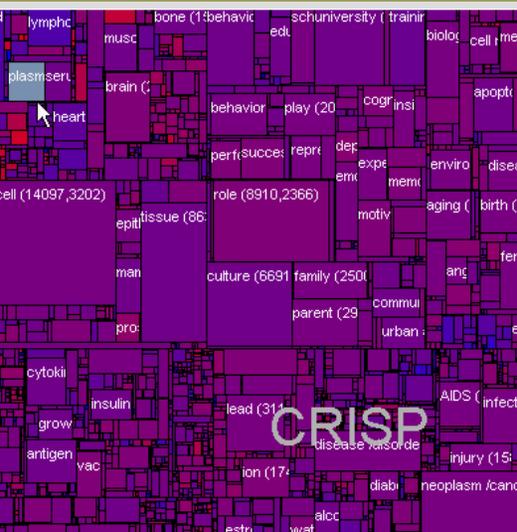
1. [Change of Grantee or Training In Institution \(Type 7\) \(t](#)
2. [Change of Institute or Division New \(Type 6\) \(type_of](#)
3. [Change of Institution or Division Competing Continuatio](#)
4. [Change of Institution or Division Continuation \(Type 8\)](#)
5. [Competing Continuation \(Type 2\) \(type_of_award\):32](#)
6. [Continuation \(Incrementally-Funded Contracts only\) \(T](#)



View extracted topics/entities where:

- Size = # of documents
- Color Intensity = recency of funding

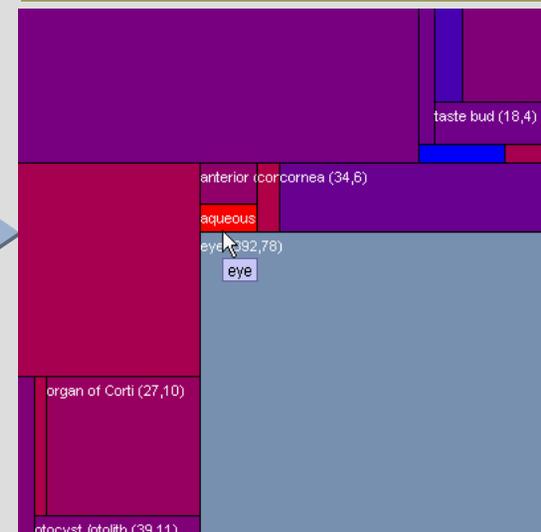
View Document Topics



Zoom in on Clusters

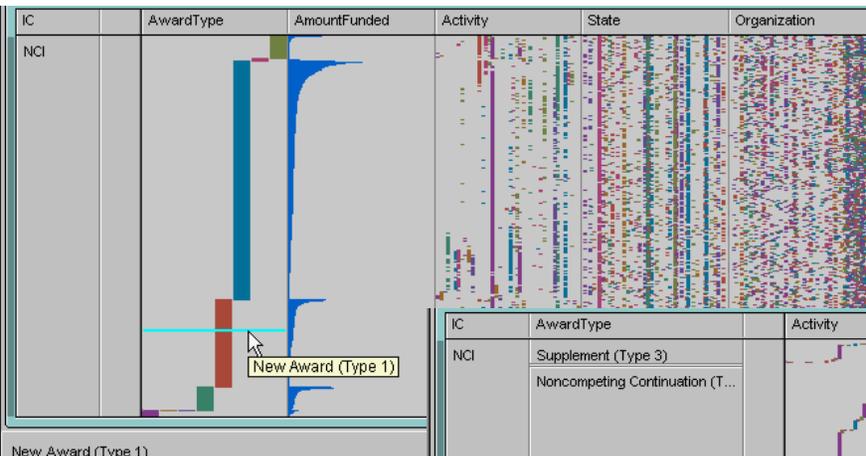


Locate Emerging Topic(s)



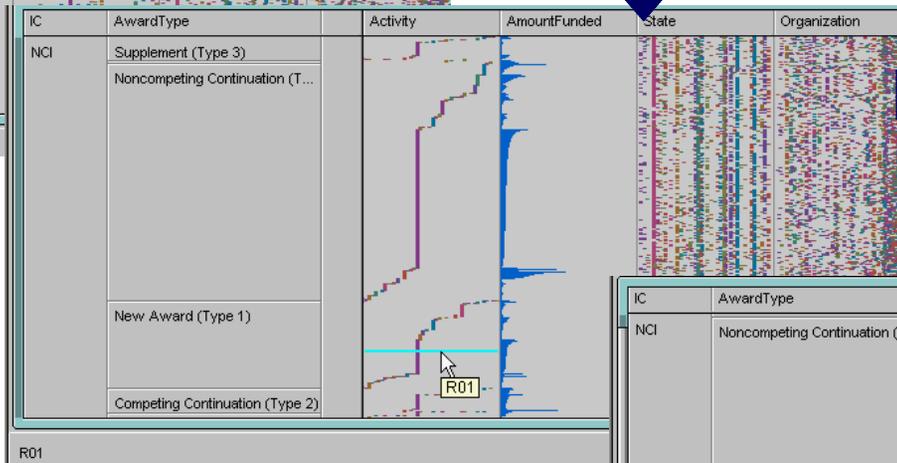
Online Analytical Processing

Identify Patterns and Trends in Relational Data



"Slice and Dice" data to identify patterns and trends

Re-arrange columns and sort to identify patterns

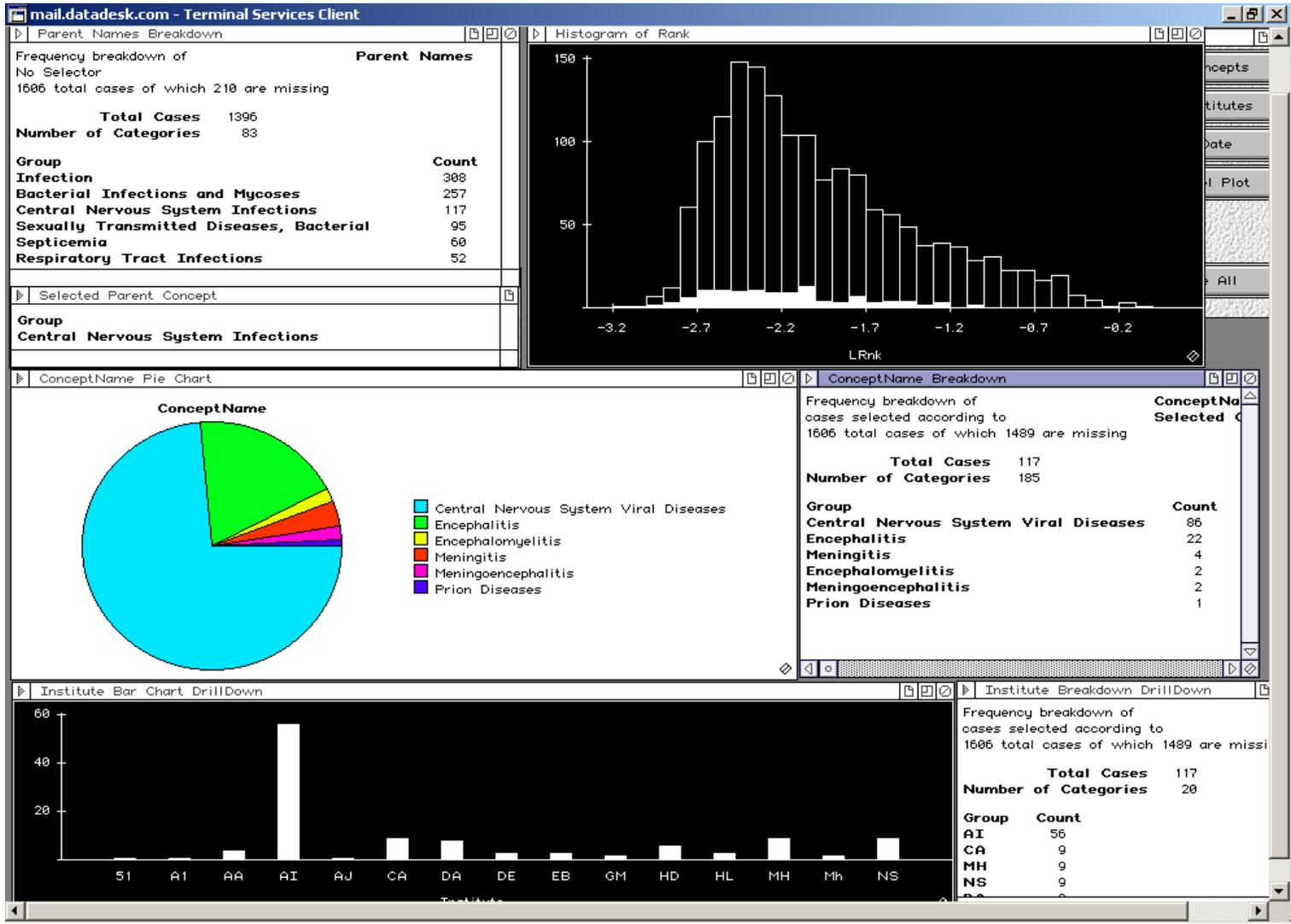


Expand record(s) to view data details

IC	AwardType	Activity	AmountFunded	State	Organization
NCI	Noncompeting Continuation (T...	R01	1620 584006	TEXAS	UNIVERSITY OF TE...
			1621 576560	CONNECTICUT	YALE UNIVERSITY
			1622 576393	WASHINGTON	FRED HUTCHINSON...
			1623 572530	CALIFORNIA	RAND CORPORATION
			1624 571791	CALIFORNIA	UNIVERSITY OF CA...
			1625 569308	CALIFORNIA	UNIVERSITY OF CA...
			1626 568509	CALIFORNIA	SALK INSTITUTE FO...
			1627 567739	NEW HAMPSHIRE	DARTMOUTH COLL...
			1628 567179	WASHINGTON	FRED HUTCHINSON...
			1629 564119	OHIO	CASE WESTERN RE...
			1630 558710	NEW YORK	YESHIVA UNIVERS...
			1631 555641	MISSOURI	ST. LOUIS UNIVERS...

Exploratory Data Analysis

Data Visualization



Proposal Trend Analysis

Identify Research Trends for Incoming Research Proposals

Enter Month

'January 2003'

Identify research area trend for each incoming application

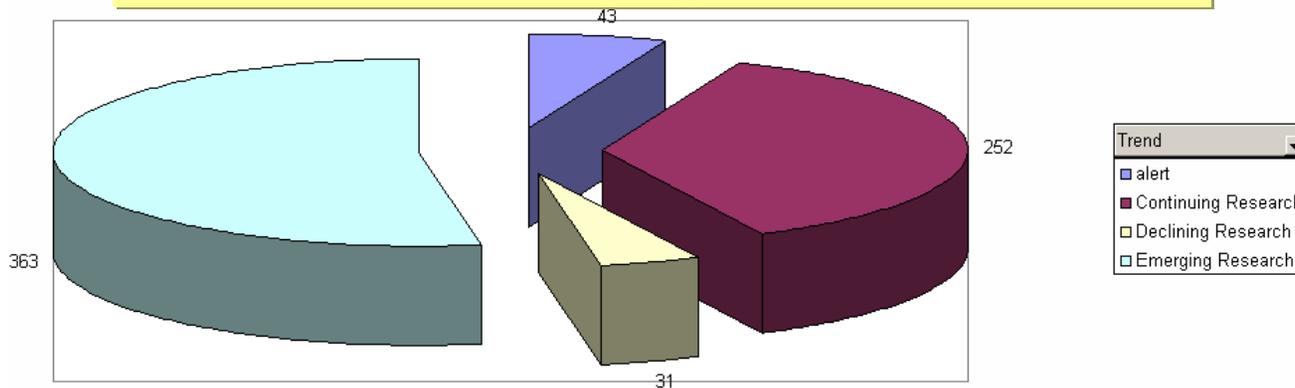
Criteria Matrix

Trend	Identify Similar Proposals	Grant Number - Identify Reviewers	Author	Title	Fingerprints
Emerging Research Area	Similar Proposals	1 R01 DA015728-01 A1	"Richelson, E"	Novel Neurotensin Analogs To Treat Nicotine Dependence	Fingerprints
Emerging Research Area	Similar Proposals	1 R01 DA015083-01 A2	"Richelson, E"	A Neurotensin Agonist for Psychostimulant Abuse	Fingerprints
Declining Research Area	Similar Proposals	1 R01 CA101694-01	"Price, J"	"Auto Scan, Score & Visualize Cancer Tissue Microarrays"	Fingerprints
Emerging Research Area	Similar Proposals	2 R01 EY012355-04 A1	"Guy, J"	Leber Hereditary Optic Neuropathy: Gene Therapy	Fingerprints
Emerging Research Area	Similar Proposals	1 R01 AI055366-01 A1	"Haller, D"	In Vitro Correlates of Rapamycin Therapy in MS Patients	Fingerprints

Similar Proposed Applications	Similar Funded Applications	Research Trend
✓	✓	Continuing Research Area
✓	✗	Emerging Research Area
✗	✗	Alert Areas
✗	✓	Declining Research Areas

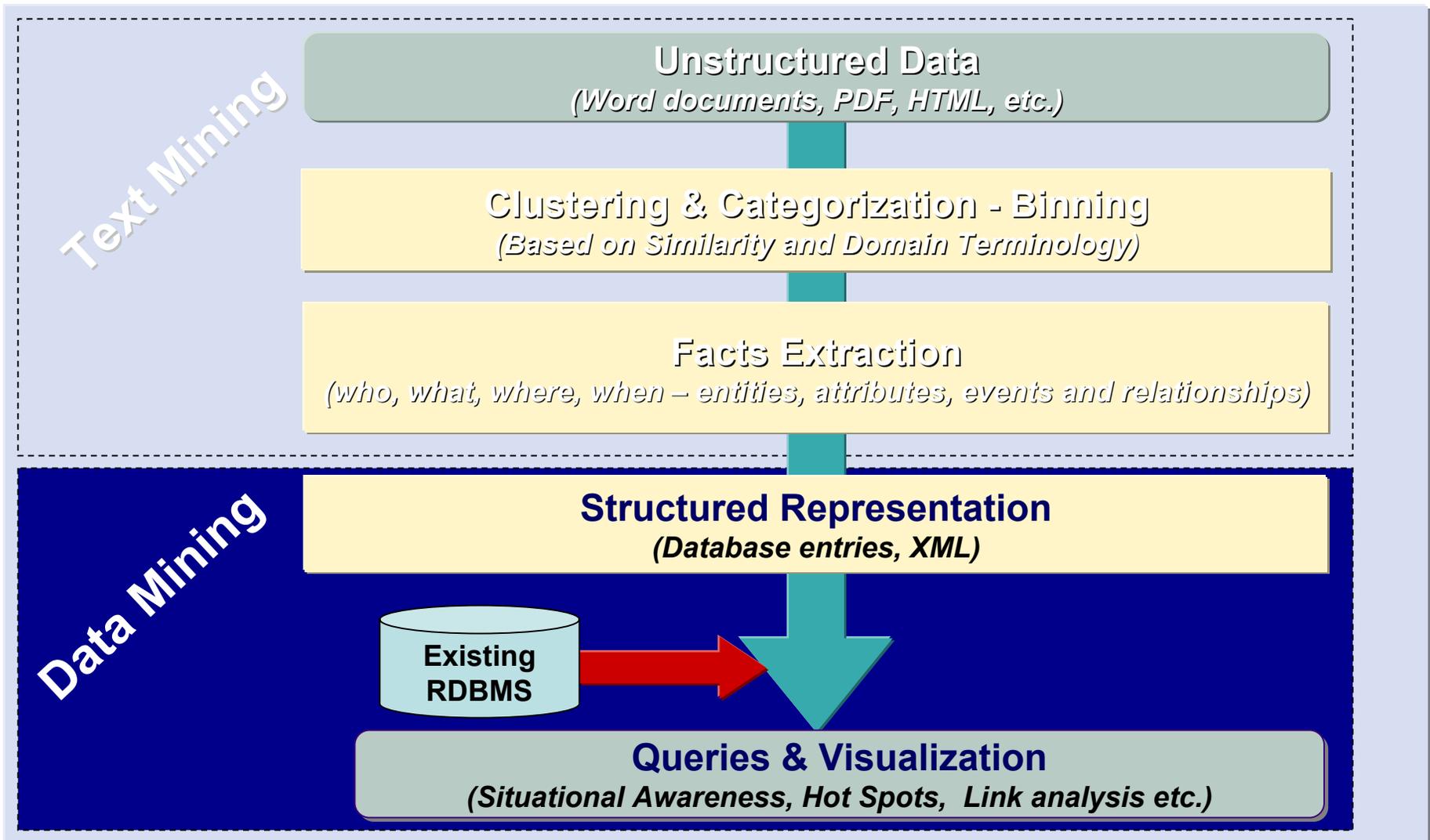
Research Trend Analysis for the month of January 2003

Total Number of applications: 689



KM Functionality Overview

From Unstructured to Structured Data



LoI with Collaborative System-of-Systems

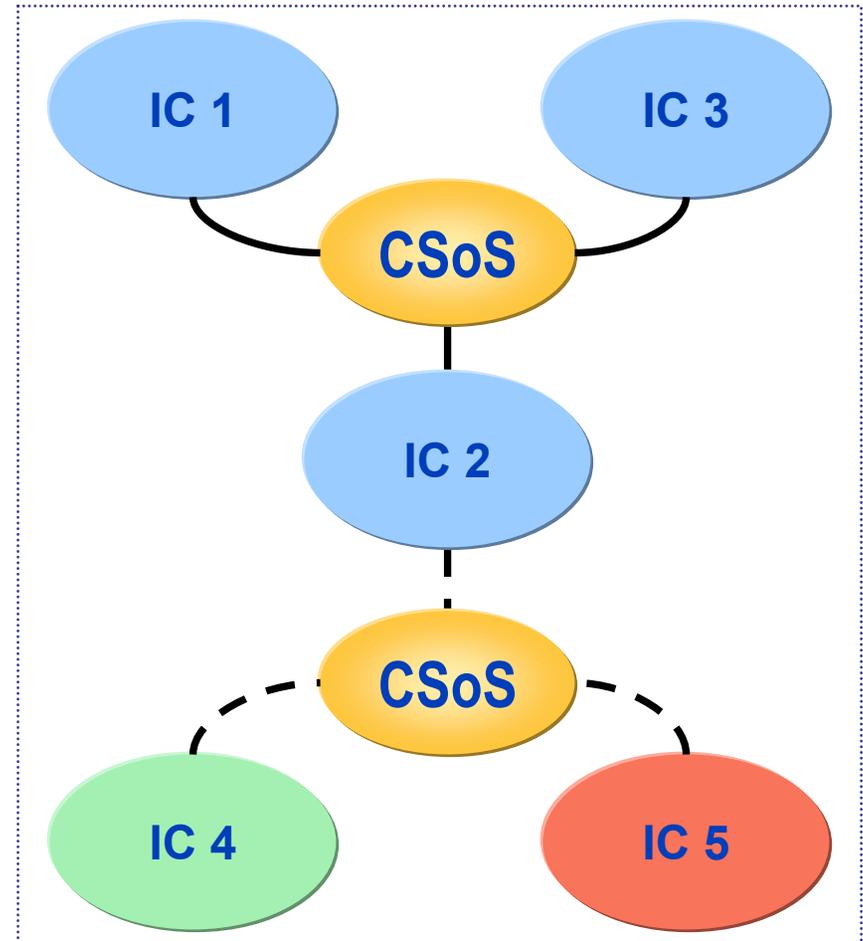
Architecture for System Integration

Challenge

- Promote seamless information sharing across multiple organizations sharing a common objective.

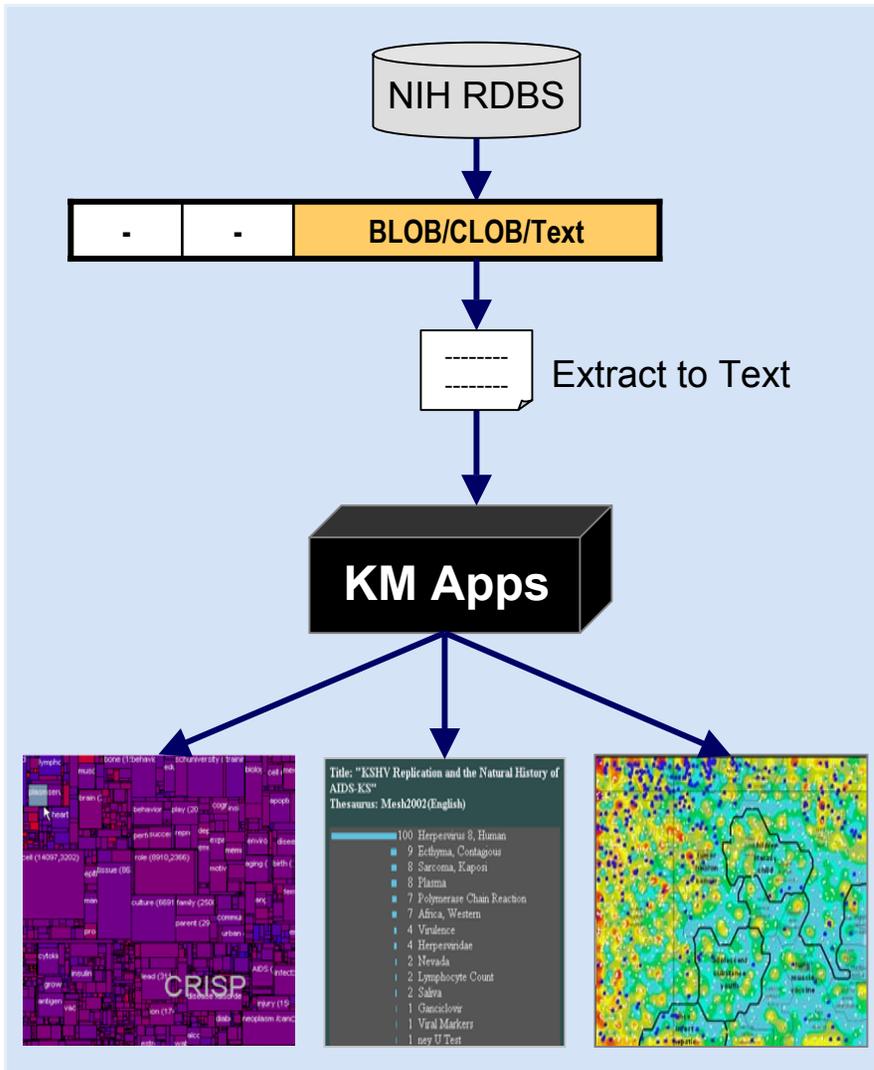
Solution

- Insert an Integrated System-of-Systems (ISS) to “buffer” each organization.
- Increase the role and scope of the “buffer” over time (*i.e. investigation* → *topic* → *all information*)



Clinical Relevance: Accessing Clinical Data

Adding Value to Structured Data Sources



- Utilize advanced visualization techniques to provide improved access to clinical data for interpretation of basic research and assessment of discoveries
- Clinical RDB's have text fields that store significant clinical information
- Currently, clinical researchers can, at best, search these text fields by keywords (needle in haystack approach)
- If text fields could be fingerprinted on-the-fly, a researcher could:
 - Search for similar cases and their treating clinician
 - Search for similar treatment outcomes (negative or positive)
- Approach could be reused in any RDB (IMPAC II, CRISP, etc.) for an almost unlimited variety of applications

K-Layer

One Stop Search

Enter Grant Number

1 R01 AI04352-06 A1 Find

Genes virulence salmonella

Search by Proposal or Body of Text

Fingerprint

Similarity Finder

Expertise Locator

Modify Search Criteria on-the-fly

Fingerprint Modifier

Genes 100

Virulence 45

Salmonella 35

Promoter (Genetics) 31

Mice 30

Transcription, Genetic 24

Lipids 24

Proteins 24

Cells 21

Peptides 20

Infection 15

Salmonella typhimurium 15

Research Personnel 15

Programs [Publication] 14

Operon 13

Save this Fingerprint

Add concept: Add

All 0 All 50 Reset Search

Similar Proposed Proposals	Grant# & Fingerprints	Author	Matching Score
Host Genes Targeted By Salmonella Virulence Factors	1 R01 AI057953-01	"Aballay, A"	73.5794
Molecular and Structural Bases of Polymyxin Resistance	2 R01 AI042236-06	Groisman, E	63.0918
Comparative Genome Analysis of Salmonella Species	2 R01 AI034829-14 A1	McClelland, M	62.2984
Alternative Model Hosts for Yersinia Pestis Pathogenesis	1 R01 AI057665-01	"Aballay, A"	59.9095
MOLECULAR GENETIC ANALYSIS OF	R01AI24533-12	Curtiss, T. T.	54.9756

Recommended Reviewers(CRISP)

Miller, Samuel I

Guiney, Donald G

Baumler, Andreas J

Heffron, Fred L

Galan, Jorge E

Curtiss, Roy I, Iii

O'brien, Alison D

Contag, Christopher H

Miller, Virginia L Pi

McClelland, Michael

Recommended Reviewers (MedLine)

Miller S I

Jones B D

Gunn J S

Ernst R K

Schwan W R

Hu L

Kopecko D J

Fingerprint Modifier

Genes Req

Virulence 0

Salmonella 0

Promoter (Genetics) 0

Mice 0

Transcription, Genetic 0

Lipids 0

Proteins 0

Cells 0

Peptides 0

Infection 0

Salmonella typhimurium 0

Research Personnel 0

Programs [Publication] 0

Operon 0

Save this Fingerprint

Add concept: Add

All 0 All 50 Reset Search

Modified Search Results

Fingerprint Modifier

Genes Req

Virulence 0

Salmonella 0

Promoter (Genetics) 0

Mice 0

Transcription, Genetic 0

Lipids 0

Proteins 0

Cells 0

Peptides 0

Infection 0

Salmonella typhimurium 0

Research Personnel 0

Programs [Publication] 0

Similar Proposed Proposals	Grant# & Fingerprints	Author	Matching Score
Cell-Based Functional Genomics of Trypanosome Infection	1 R01 AI054725-01 A1	"Villalta, F"	77.3215
by	1 R01 AG021173-01 A2	Xu, H	66.1166
Use of Microarrays to Understand Systemic Arthritis	1 R01 AR050770-01	Pascual, V	58.8061
Gene Expression,	2 R01	Soriano,	50.0000

Recommended Reviewers(CRISP)

Levy, David E

Collman, Ronald G

Margolis, Todd P

Levy, David E

Harrod, Kevin S

Dornburg, Ralph C

Albritton, Lorraine M

He, Johnny J

O'callaghan, Dennis J

Patterson, Catherine E

Recommended Reviewers (MedLine)

de Avalos Silvia Vaena

Ad-Hoc Community of Practice

Importing Experts and Content

The screenshot displays the Groove KM Space interface. At the top, the title bar reads 'KM Space Files' and 'Rueda (Manager)'. The main window is divided into several sections:

- Left Panel:** Contains an 'Invite' button, a list of users under 'Active' (Rueda), 'Online' (Smith), 'Not Online', and 'Suspended'.
- Top Bar:** Includes navigation buttons like 'Back', 'Add Files...', 'Download', and 'Start Session'.
- Main Content Area:** A table listing files in the 'KM Folder'.

Name	Modified Date	Modified By
Host Genes Targeted By Salmonella Virulence Factors	10/8/2003 10:48:1...	Rueda
Salmonella Gene Expression In Complex Environments	10/8/2003 10:49:1...	Rueda
Alternative Model Hosts for Yersinia Pestis Pathogenesis	10/8/2003 10:48:3...	Rueda
Comparitive Genome Analysis of Salmonella Species	10/8/2003 10:48:5...	Rueda
Salmonella Antimicrobial Peptide Resistance	10/8/2003 10:47:4...	Rueda

Below the table, a 'Send Invitation - Groove' dialog box is open. It contains the following fields:

- To:** Rueda (selected from a dropdown menu)
- Shared Space:** KM Space
- Role:** Manager
- Message:** Please join to discuss Fingerprint results.
- Attachments:** File..., URL..., Remove
- Require acceptance confirmation
- Buttons:** Invite, Cancel

At the bottom of the interface, there is a 'Conversation' section with 'Hold-To-Talk' and 'Hide Chat (1)' options, and a 'Navigate Together' checkbox.

Locating and Accessing Content

Automatic Categorization

Taxonomy Drill Down Path:

Root Category > NIH > Diseases > Musculoskeletal Diseases

Taxonomy

Browse Categories

Root Category

▼ NIH

▼ Diseases

▼ **Musculoskeletal Diseases**

▶ Bone Diseases

▶ Foot Deformities

▶ Joint Diseases

▶ Muscular Diseases

▶ Musculoskeletal Abnormalities

▶ Rheumatic Diseases

Content

Musculoskeletal Diseases

Document Matches: (1 - 10 of 10)

Order Documents By:

-  **High-Heel Shoe Impact on Knee and Hip Joint Torques** 
0 Principal Investigator/ Program Director(Last, first, middle): Kerrigan, D. CaSev A. Specific Aims Based on previous findngs that certain women's hgh- heeled dress shoes cause abnormal knee torques and p r e b a r y data supporting . . .
URL: <http://snapper.mitretex.org/nih/researchplans/january%202002/787822.pdf>
Author: Kerrigan, D
42% 
-  **Diagnosis and Treatment of Shoulder Injuries** 
0 Principal Investigator/PrQgram Director(Pimko, Gerald, Edward): Piesko, Gerald Edward The National Institute of Health has already established the fact musculoskeletal diseases present a substntial health hazards to our populat~ on. Although . . .
URL: <http://snapper.mitretex.org/nih/researchplans/january%202002/783470.pdf>
Author: Piesko, G
39% 
-  **Medical Guideline Adherence and Carpal Tunnel Outcomes** 
0 CONTINUATIONPAGE PrincipallInvestigator/ ProgramDirector: Weaver, MichaelT. (Last, first, middle) RESEARCH PLAN A. SPECIFIC AIMS We have assembled an interdisciplinary team of nationally recognized researchers to define and analyze . . .

Discovering Relationships from Text

Relationship Identification

Select :

Generic

8

Detail

PATH: rheumatoid arthritis ; rheumatoid arthritis(2)

3 Derivatives. Database: crisp.basicview

Documents

Maps

- +rheumatoid arthritis
- +sex steroid
- +signaling pathway
- +site-directed mutagen
- +smoking
- +social science research
- +sodium channel
- +stanford university
- +structural analysis
- +surgery
- +systemic lupus erythematosus
- +third aim
- +three-dimensional structure
- +thrombosis
- +thymidine kinase

Worlds

- [649]nucleic acid
- (1)fourth project

NIH Architecture of KM Systems

